

Abstract

According to one exemplary embodiment, a projection lens having an object plane and an image plane is provided and includes the following lens groups listed objectwise to imagewise: (1) a first lens group having negative refractive power; and (2) at least three other lens groups having a positive refractive power and at least one other lens group having a negative refractive power. In one embodiment, the projection lens includes a second lens group having a positive refractive power; a third lens group having a negative refractive power; and fourth, fifth and sixth lens groups having overall positive refractive power. The projection lens having a numerical aperture of at least about 0.85 and is of a $1\frac{1}{2}$ waist construction, with the $\frac{1}{2}$ waist defined in the first lens group and a primary waist is defined in the third lens group.